---------- CEN 4072/6070 Software Testing & Verification ----------

Quiz 2 -- Spring 2017 – Solution Notes

1. lo: (1,2) (1,7) (1,<6,2>) (1,<6,7>)
(3,2) (3,7) (3,<6,2>) (3,<6,7>)

found: (1,7) (1,<6,2>) (1,<6,7>)
(5,7) (5,<6,2>) (5,<6,7>)

mid: (2,3) (2,4) (2,7) (2,<2,3>) (2,<2,4>) (2,<2,5>)

2. (1,7): <1,2,3,6,7> <1,2,5,6,7> <1,2,3,6,2,5,6,7> <1,2,5,6,2,3,6,7>
(4,7): <4,6,7> <4,6,2,3,6,7> <4,6,2,5,6,7>
(1,<6,2>): <1,2,3,6,2> <1,2,5,6,2>
(4,<6,7>): <4,6,7>

3. none

4. statement, all-defs

5. statement, branch, all-defs

6. (1) $lo_1 = 1$
$hi_1 = 2$
$found_1 = FALSE$

(2,1) $lo_{2,1} = lo_1 = 1$
$hi_{2,1} = hi_1 = 2$
$found_{2,1} = found_1 = FALSE$
$mid_{2,1} = (lo_1 + hi_1)$ div 2 = (1+2) div 2 = 1

(3,1) $lo_{3,1} = mid_{2,1} + 1 = 1 + 1 = 2$
$hi_{3,1} = hi_{2,1} = 2$
$found_{3,1} = found_{2,1} = FALSE$
$mid_{3,1} = mid_{2,1} = 1$

(6,1) $lo_{6,1} = lo_{3,1} = 2$
$hi_{6,1} = hi_{3,1} = 2$
$found_{6,1} = found_{3,1} = FALSE$
$mid_{6,1} = mid_{3,1} = 1$

(2,2) $lo_{2,2} = lo_{6,1} = 2$
$hi_{2,2} = hi_{6,1} = 2$
$found_{2,2} = found_{6,1} = FALSE$
$mid_{2,2} = (lo_{6,1} + hi_{6,1})$ div 2 = (2 + 2) div 2 = 2

(3,2) $lo_{3,2} = mid_{2,2} + 1 = 2+1 = 3$
$hi_{3,2} = hi_{2,2} = 2$
$found_{3,2} = found_{2,2} = FALSE$
$mid_{3,2} = mid_{2,2} = 2$

(6,2) $lo_{6,2} = lo_{3,2} = 3$
$hi_{6,2} = hi_{3,2} = 2$
$found_{6,2} = found_{3,2} = FALSE$
$mid_{6,2} = mid_{3,2} = 2$

7. $(key_{2,1} > list_{2,1}[mid_{2,1}])$ AND $(\text{NOT } found_{6,1} \text{ AND } lo_{6,1} <= hi_{6,1})$ AND
   $(key_{2,2} > list_{2,2}[mid_{2,2}])$ AND $(found_{6,2} \text{ OR } lo_{6,2} > hi_{3,2})$

8. $(key_1 > list_1[1])$ AND $(\text{NOT FALSE AND } 2 <= 2)$ AND
   $(key_1 > list_1[2])$ AND $(\text{FALSE OR } 3 > 2)$

   $= (key_1 > list_1[1])$ AND $(key_1 > list_1[2])$
   $= (key_1 > a)$ AND $(key_1 > b)$

9. *key:* 17 *a:* 5 *b:* 9 (any values of *key, a,* and *b* such that $a \le b < key$)